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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,183	04/19/2004	David R. Beard	584-36526-US	2430
24923	7590	08/10/2005	EXAMINER	
PAUL S MADAN MADAN, MOSSMAN & SRIRAM, PC 2603 AUGUSTA, SUITE 700 HOUSTON, TX 77057-1130			VARGAS, DIXOMARA	
			ART UNIT	PAPER NUMBER
			2859	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/827,183	Applicant(s) BEARD ET AL.	
	Examiner Dixomara Vargas	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-25 and 27-34 is/are rejected.
- 7) ☒ Claim(s) 10 and 26 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>04/19/04; 11/15/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-6, 8-9, 11-22, 24-25 and 27-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Prammer (US 2004/0008027 A1).

With respect to claim 1, Prammer discloses a method for correcting signals received from an earth formation using a Nuclear Magnetic Resonance (NMR) tool in a borehole in said earth formation, the method comprising (Paragraph 0088):

- (a) exciting said earth formation with a first pulse sequence having a first recovery time;
- (b) exciting said earth formation with a plurality of additional pulse sequences having a second recovery time less than said first recovery time (Paragraph 0046);
- (c) determining from spin echo signals resulting from said additional pulse sequence an estimate of a non-formation signal; and

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(d) correcting spin echo signals resulting from said first pulse sequence using said estimate (Paragraph 0041).

4. With respect to claim 2, Prammer discloses at least one of said additional pulse sequences has a duration less than a duration of said first pulse sequence (Figure 3).

5. With respect to claim 3, Prammer discloses said second recovery time corresponds to a partial recovery of nuclear spins in said earth formation (Figure 27).

6. With respect to claims 4 and 20, Prammer discloses said additional pulse sequences comprise clay bond water (CBW) sequences (Paragraph 0005).

7. With respect to claims 5 and 21, Prammer discloses said additional pulse sequences have durations less than 40 ms (Paragraphs 219 and 235).

8. With respect to claims 6 and 22, Prammer discloses said first and additional pulse sequences comprise CPMG sequences (Paragraph 0049).

9. With respect to claims 8 and 24, Prammer discloses the step wherein the additional pulse sequences comprise pulse sequences having a plurality of pairs of phase-alternated pairs (PAP) of pulse sequence (Paragraphs 149-155).

10. With respect to claims 9 and 25, Prammer discloses the step wherein the PAP sequences have a specified phase relationship to each other (Paragraphs 149-155).

11. With respect to claims 11 and 27, Prammer discloses the step wherein said non-formation signal comprises a ringing from a refocusing pulse (Paragraph 0041).

12. With respect to claims 12 and 28, Prammer discloses the step wherein said non-formation signal comprises a ringing from an excitation pulse (Paragraph 0041).

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13. With respect to claims 13, 14, 29 and 30, Prammer discloses the step wherein estimating said ringing from said excitation and refocusing pulse comprises: (i) separately estimating a ringing from each one of said plurality of phase alternated pairs; (ii) forming a vector sum of said separate estimates of the echo signal (Paragraphs 153-169).

14. With respect to claims 15 and 31, Prammer discloses the step of processing spin echo signals for determining at least one of (i) a T2 distribution, (ii) total porosity, (iii) bound volume irreducible, (iv) a T1 distribution, (v) clay bound water, (vi) bound water moveable, and (vii) a sum of echos (Paragraph 215).

15. With respect to claims 16 and 32, Prammer discloses the step of conveying said NMR tool into said earth formation on one of: (i) wireline, (ii) a drilling tubular, and (iii) a slickline (Paragraph 145).

16. With respect to claims 17, 18, 33 and 34, see rejection of claims 1, 8 and 11-14 above.

17. With respect to claim 19, Prammer discloses an apparatus for conducting logging operations in a borehole in an earth formation, the apparatus comprising (as seen on Figure 2):

(a) a magnet on a Nuclear Magnetic Resonance (NMR) tool which polarizes nuclear spins in a region of interest in the earth formation (#10);

(b) an antenna on the NMR tool which (#16):

(A) excites said earth formation with a first pulse sequence having a first recovery time;

(B) excites said earth formation with a plurality of additional pulse sequences having a recovery time less than said first recovery time (Paragraph 0046);

(c) a processor which (#32):

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(C) determines from spin echo signals resulting from said additional pulse sequences an estimate of a non-formation signal, and

(D) corrects spin echo signals resulting from said first pulse sequence using said estimate and obtaining corrected spin echo signals (Paragraph 0041).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prammer (US 2004/0008027 A1) in view of Edwards (US 6,452,389 B1).

With respect to claims 7 and 23, Prammer discloses the claimed invention as stated above in paragraph 2 except for the step wherein the first pulse sequence and additional pulse

sequences comprises a modified CPMG sequence having a tip angle of a refocusing pulse that is less than 180° . However, Edwards discloses a pulse sequence comprised of a modified CPMG sequence having a tip angle of a refocusing pulse that is less than 180° (Column 15, lines 10-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a pulse sequence comprised of a modified CPMG sequence having a tip angle of a refocusing pulse that is less than 180° as taught by Edwards' with Prammer's method for correcting signals for the purpose of improving the SNR as taught by Edwards (Column 15, lines 10-27).

Allowable Subject Matter

21. Claims 10 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
22. The following is a statement of reasons for the indication of allowable subject matter:
 - a. With respect to claim 10, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a method for correcting signals received from an earth formation using a Nuclear Magnetic Resonance (NMR) tool in a borehole in said earth formation, the method comprising the step wherein the number of pairs of PAP sequences n_f and, frequency shift between said pairs of PAP sequences δf are related according to: $n_f * \delta f = m/t$; where m is any integer that is not multiple of n_f in combination with the remaining limitations of claims 1 and 8 above.

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b. With respect to claim 26, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest an apparatus for conducting logging operations in a borehole in an earth formation, the apparatus comprising a processor with a number of pairs of PAP sequences n_f and, frequency shift between said pairs of PAP sequences δf are related according to: $n_f * \delta f = m/t$, where m is any integer that is not multiple of n_f in combination with the remaining limitations of claims 19 and 24 above.

Conclusion


23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional prior art cited in the PTO 892 discloses MR logging systems with different pulse sequences of different recovery times to correct for ringing effects.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (571) 272-2252. The examiner can normally be reached on Monday to Thursday from 8:00 am. to 4:30 pm..


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Dixomara Vargas
Art Unit 2859
August 2, 2005



Louis Arana
Primary Examiner